MAYO CLINIC LABORATORIES

Test Definition: CACR3

Calcium/Creatinine Ratio, Random, Urine

Overview

Useful For

Evaluation of calcium oxalate and calcium phosphate kidney stone risk

Calculation of urinary supersaturation

Evaluation of bone diseases, including osteoporosis and osteomalacia

Profile Information

Test Id	Reporting Name	Available Separately	Always Performed
CCTR	Calcium/Creat Ratio, Random, U	No	Yes
CALC5	Calcium, Random, U	No	Yes
CRETR	Creatinine, Random, U	No	Yes

Method Name

CCTR: Calculation

CALC5: Photometric

CRETR: Enzymatic Colorimetric Assay

NY State Available

Yes

Specimen

Specimen Type

Urine

Specimen Required

Supplies: Sarstedt Aliquot Tube 5 mL (T914)

Collection Container/Tube: Clean, plastic urine container with no metal cap or glued insert

Submission Container/Tube: Plastic, 5-mL tube or a clean, plastic aliquot container with no metal cap or glued insert

Specimen Volume: 4 mL

Collection Instructions:

1. Collect a random urine specimen.
2. No preservative.

Forms

If not ordering electronically, complete, print, and send a Renal Diagnostics Test Request (T830) with the specimen.

Specimen Minimum Volume

1 mL

Reject Due To

All specimens will be evaluated at Mayo Clinic Laboratories for test suitability.

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Urine	Refrigerated (preferred)	14 days	
	Ambient	72 hours	
	Frozen	30 days	

Clinical & Interpretive

Clinical Information

Calcium is the fifth most common element in the body. It is a fundamental element necessary to form electrical gradients across membranes, an essential cofactor for many enzymes, and the main constituent in bone. Under normal physiological conditions, the concentration of calcium in serum and in cells is tightly controlled. Calcium is excreted in both urine and feces. Ordinarily about 20% to 25% of dietary calcium is absorbed, and 98% of filtered calcium is reabsorbed in the kidney. Traffic of calcium between the gastrointestinal tract, bone, and kidney is tightly controlled by a complex regulatory system that includes vitamin D and parathyroid hormone. Sufficient bioavailable calcium is essential for bone health. Excessive excretion of calcium in the urine is a common contributor to kidney stone risk.

Reference Values

CALCIUM/CREATININE:
1 month-<12 months: 0.03-0.81 mg/mg creatinine
12 months-<24 months: 0.03-0.56 mg/mg creatinine
24 months-<3 years: 0.02-0.50 mg/mg creatinine
3 years-<5 years: 0.02-0.41 mg/mg creatinine
5 years-<7 years: 0.01-0.30 mg/mg creatinine
7 years-<10 years: 0.01-0.25 mg/mg creatinine
10 years-<18 years: 0.01-0.24 mg/mg creatinine
18 years-83 years: 0.05-0.27 mg/mg creatinine

Reference values have not been established for patients who are younger than 1 month.
Reference values have not been established for patients who are older than 83 years.

CREATININE:
> or =18 years old: 16-326 mg/dL
Reference values have not been established for patients who are younger than 18 years.

Interpretation

Increased urinary calcium excretion (hypercalciuria) is a known contributor to kidney stone disease and osteoporosis.

Many cases are genetic (often termed "idiopathic"). Previously such patients were often divided into fasting versus absorptive hypercalciuria depending on the level of urine calcium in a fasting versus fed state, but the clinical utility of this approach is now in question. Overall, the risk of stone disease appears increased when 24-hour urine calcium is greater than 250 mg in men and greater than 200 mg in women. Thiazide diuretics are often used to reduce urinary calcium excretion and repeat urine collections can be performed to monitor the effectiveness of therapy.

Known secondary causes of hypercalciuria include hyperparathyroidism, Paget disease, prolonged immobilization, vitamin D intoxication, and diseases that destroy bone (such as metastatic cancer or multiple myeloma).

Urine calcium excretion can be used to gauge the adequacy of calcium and vitamin D supplementation, for example in states of gastrointestinal fat malabsorption that are associated with decreased bone mineralization (osteomalacia).

Cautions

The interference of intravenously administered gadolinium-containing MRI (magnetic resonance imaging) contrast media was tested (Omniscan, Optimark). For Omniscan, no interference was observed at the therapeutic concentration, but there was interference at higher concentrations. For Optimark, interference was observed at therapeutic and higher concentrations.

Clinical Reference

1. Fraser WD. Bone and mineral metabolism. In: Rifai N, Horwath AR, Wittwer CT, eds. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. 6th ed. Elsevier; 2018:1438
2. Curhan GC, Willett WC, Speizer FE, Stampfer MJ. Twenty-four-hour urine chemistries and the risk of kidney stones among women and men. Kidney Int. 2001;59(6):2290-2298
3. Metz MP. Determining urinary calcium/creatinine cut-offs for the pediatric population using published data. Ann Clin Biochem. 2006;43(Pt 5):398-401
4. Pak CY, Britton F, Peterson R, et al. Ambulatory evaluation of nephrolithiasis. Classification, clinical presentation and diagnostic criteria. Am J Med. 1980;69(1):19-30
5. Pak CY, Kaplan R, Bone H, Townsend J, Waters O. A simple test for the diagnosis of absorptive, resorptive and renal hypercalciurias. N Engl J Med. 1975;292:497-500

Performance

Method Description

Calcium:
Calcium ions react with 5-nitro-5'-methyl-BAPTA (NM-BAPTA) under alkaline conditions to form a complex. This complex reacts in the second step with EDTA. The change in absorbance is directly proportional to the calcium concentration and is measured photometrically.(Package insert: CA2 kit. Roche Diagnostics; V9, 09/2023)

Creatinine:
The enzymatic method is based on the determination of sarcosine from creatinine with the aid of creatininase, creatinase, and sarcosine oxidase. The liberated hydrogen peroxide is measured via a modified Trinder reaction using a colorimetric indicator. Optimization of the buffer system and the colorimetric indicator enable the creatinine

concentration to be quantified both precisely and specifically.(Package insert: Creatinine plus v2. Roche Diagnostics; V3, 07/2024)

PDF Report
No

Day(s) Performed
Monday through Sunday

Report Available
1 to 3 days

Specimen Retention Time
7 days

Performing Laboratory Location
Mayo Clinic Laboratories - Rochester Main Campus

Fees & Codes

Fees
- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their account representative. For assistance, contact Customer Service.

Test Classification
This test has been cleared, approved, or is exempt by the US Food and Drug Administration and is used per manufacturer's instructions. Performance characteristics were verified by Mayo Clinic in a manner consistent with CLIA requirements.

CPT Code Information
82310
82570

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
CACR3	Calcium/Creat Ratio, Random, U	9321-1

Result ID	Test Result Name	Result LOINC® Value
CRETR	Creatinine, Random, U	2161-8
CCTR	Calcium/Creat Ratio, Random, U	9321-1
CALC5	Calcium, Random, U	17862-4